

FIG. 1

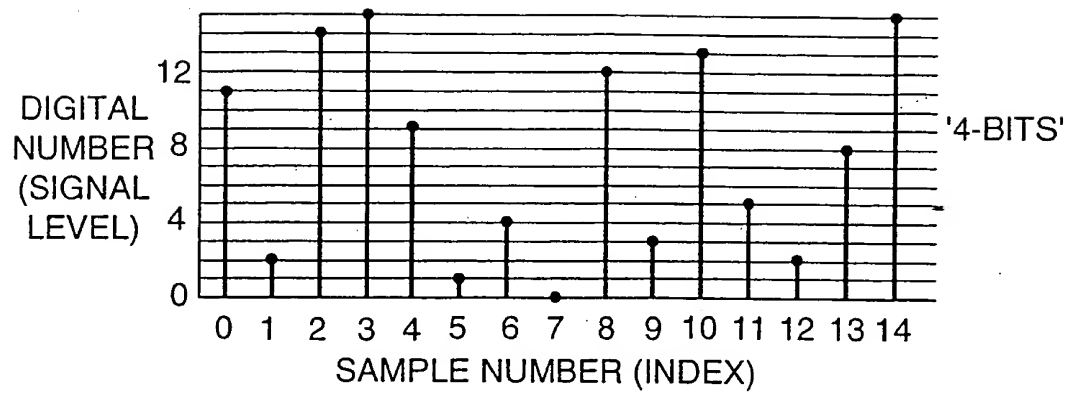


FIG. 4

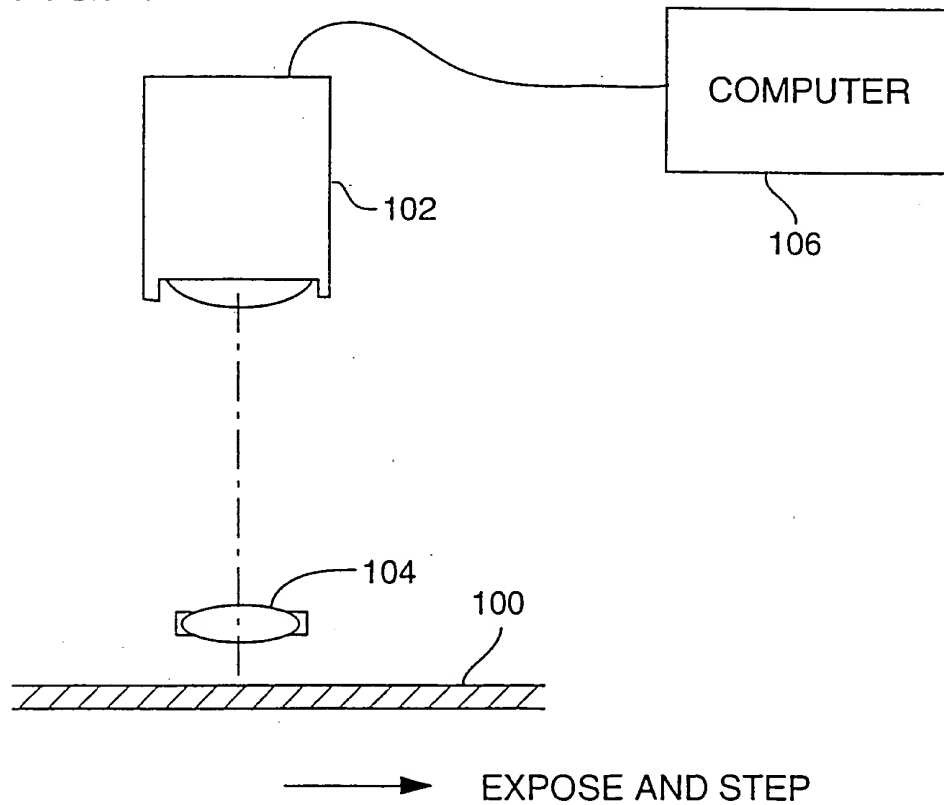


FIG. 2

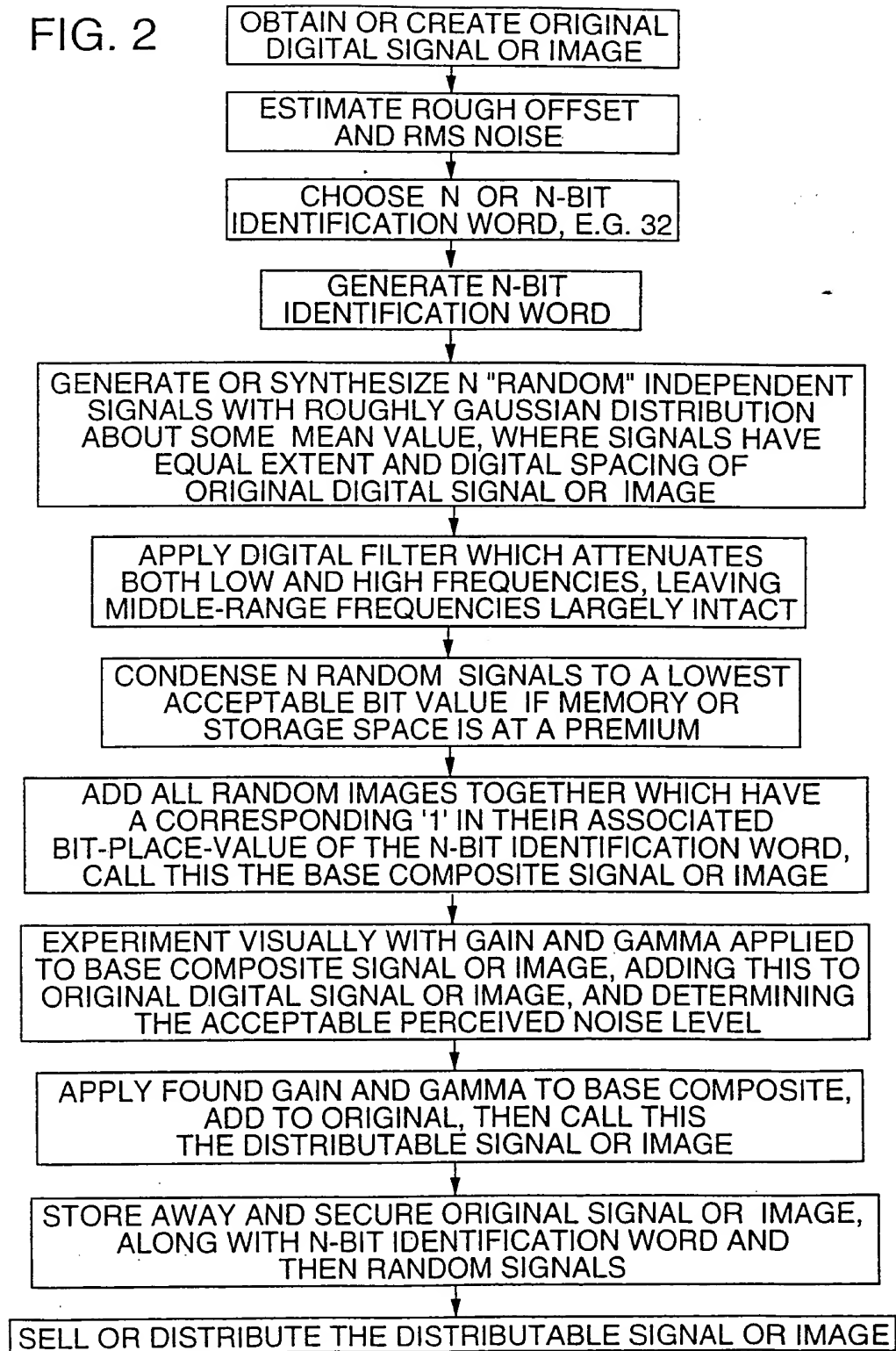


FIG. 3

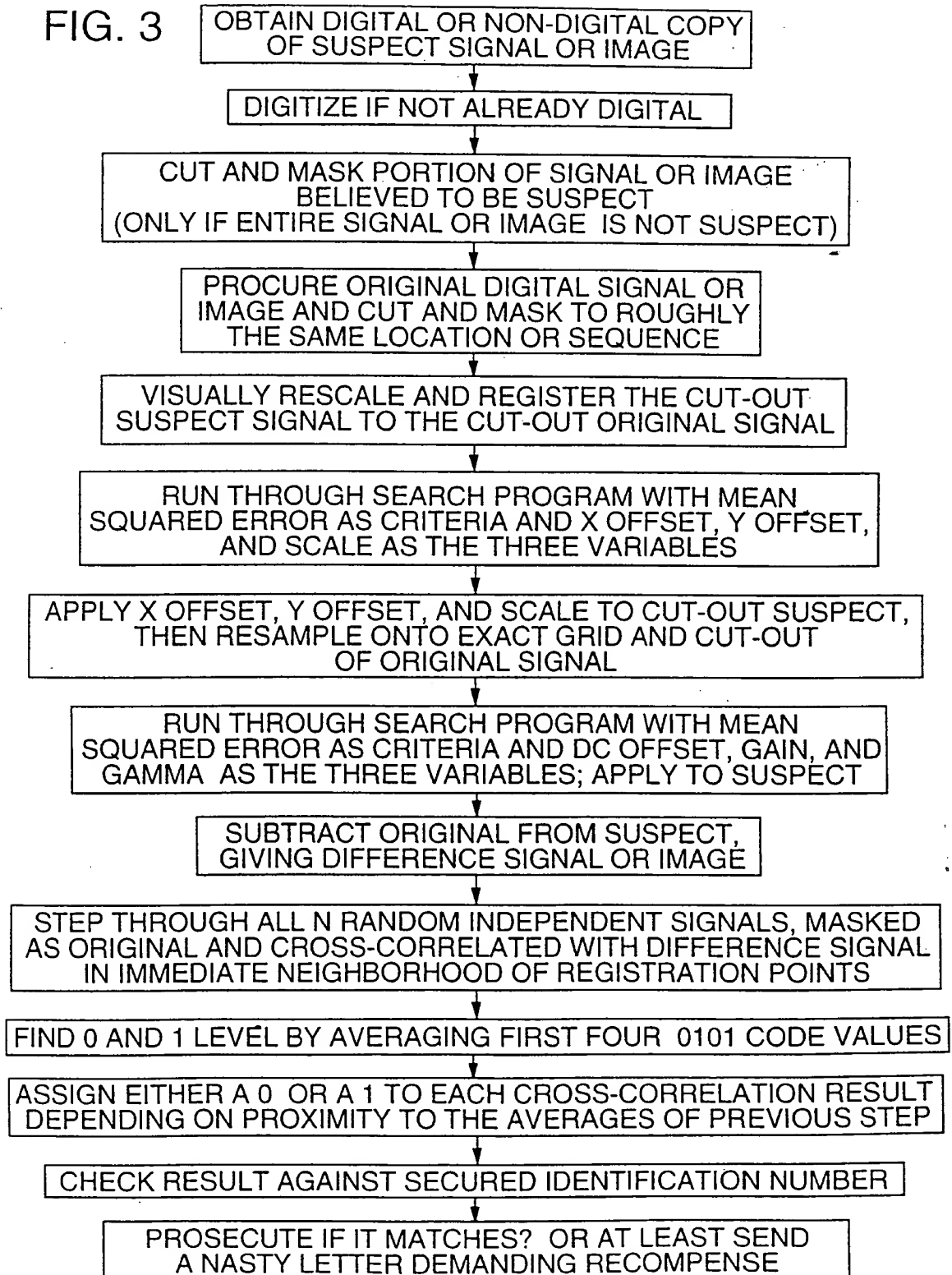


FIG. 5

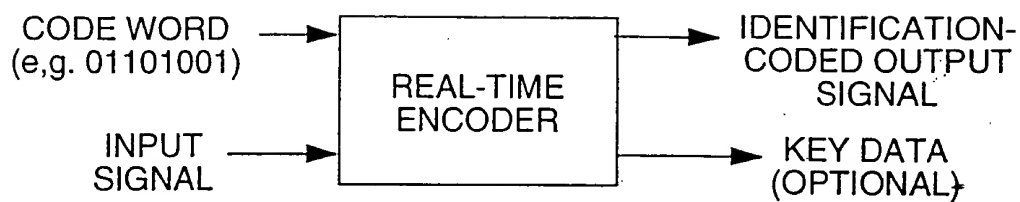
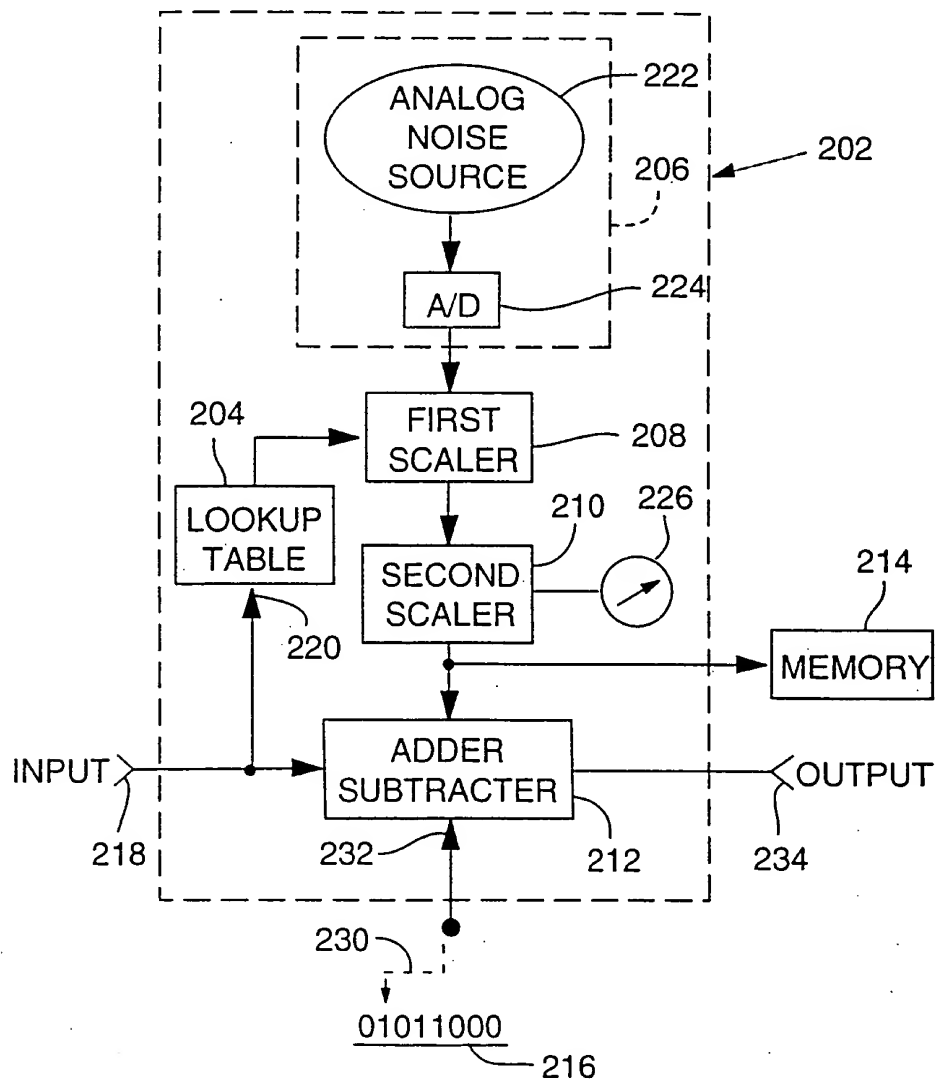


FIG. 6



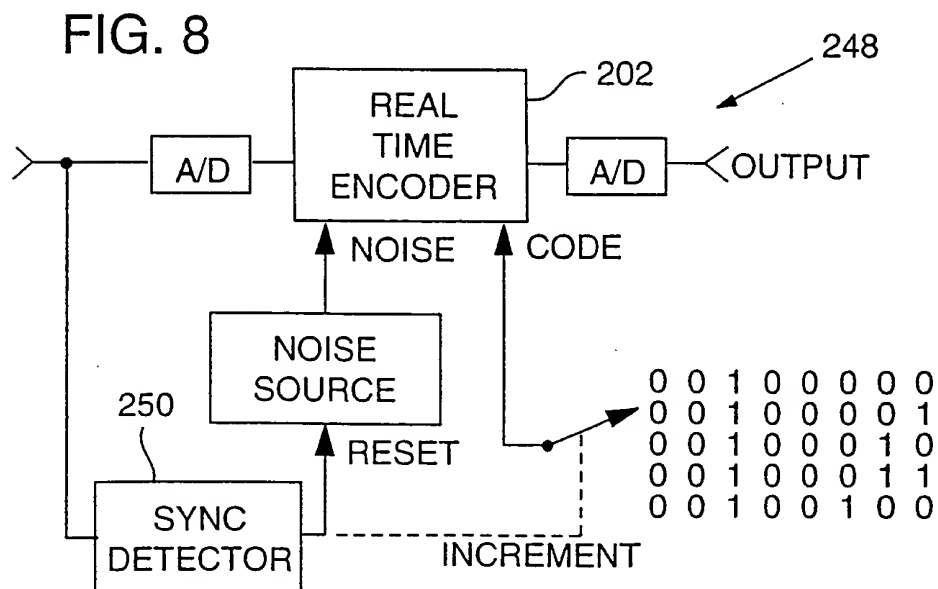
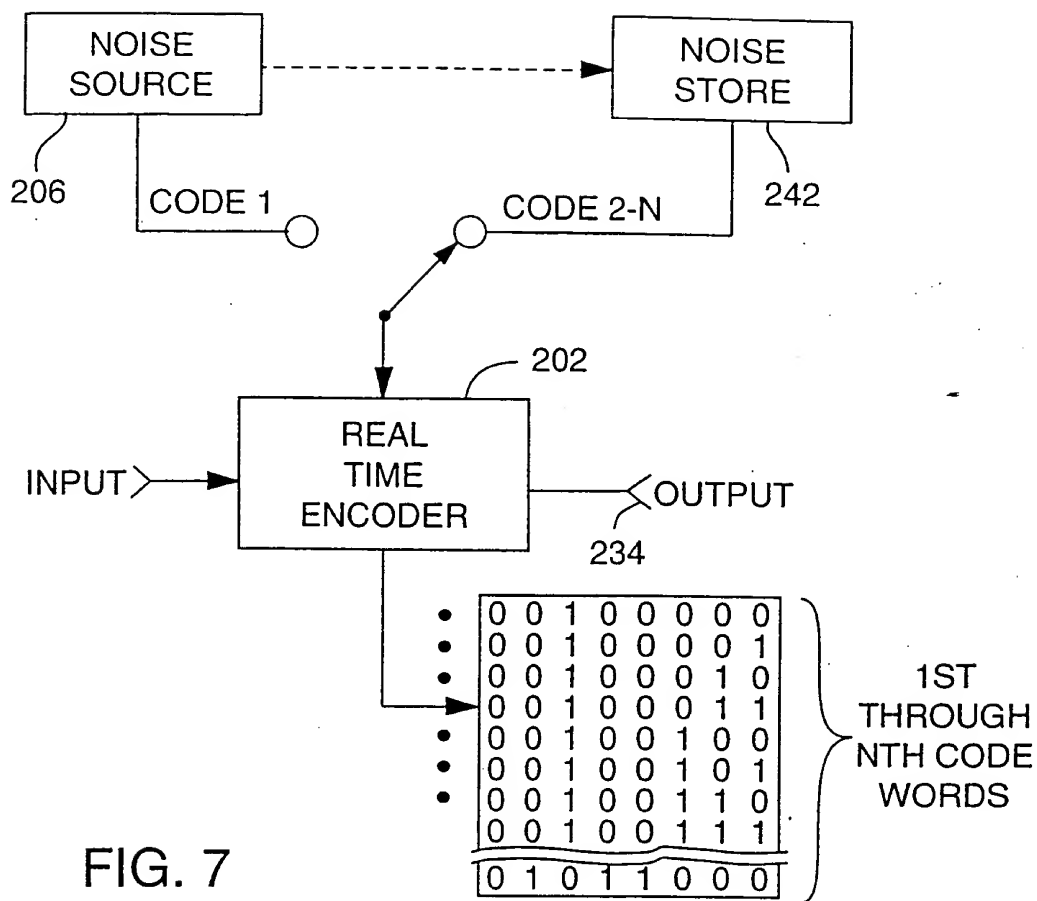


FIG. 9A

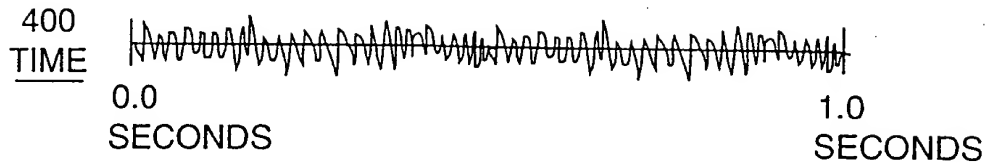


FIG. 9B

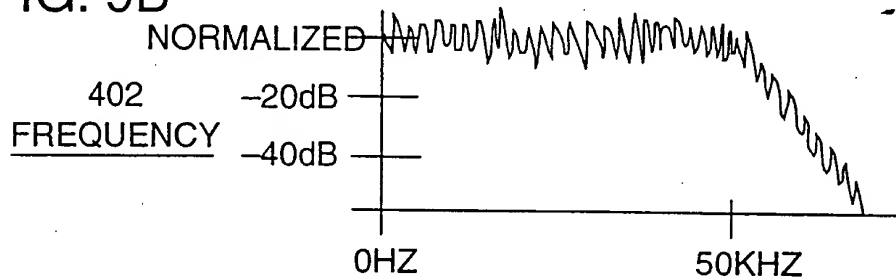


FIG. 9C

BORDER
CONTINUITY
404

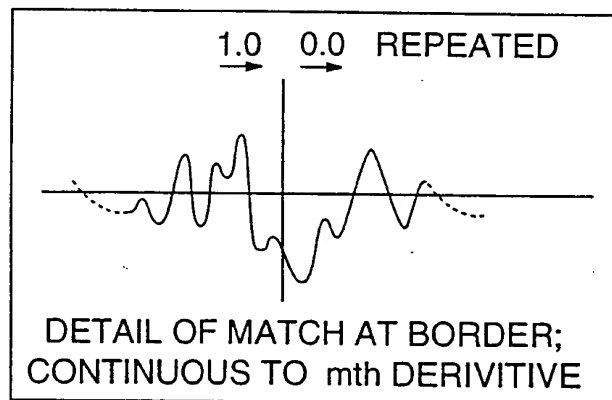


FIG. 10

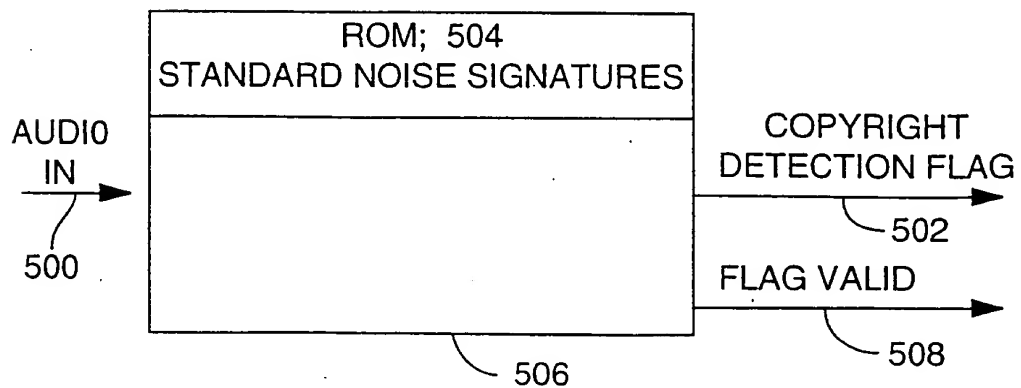


FIG. 11

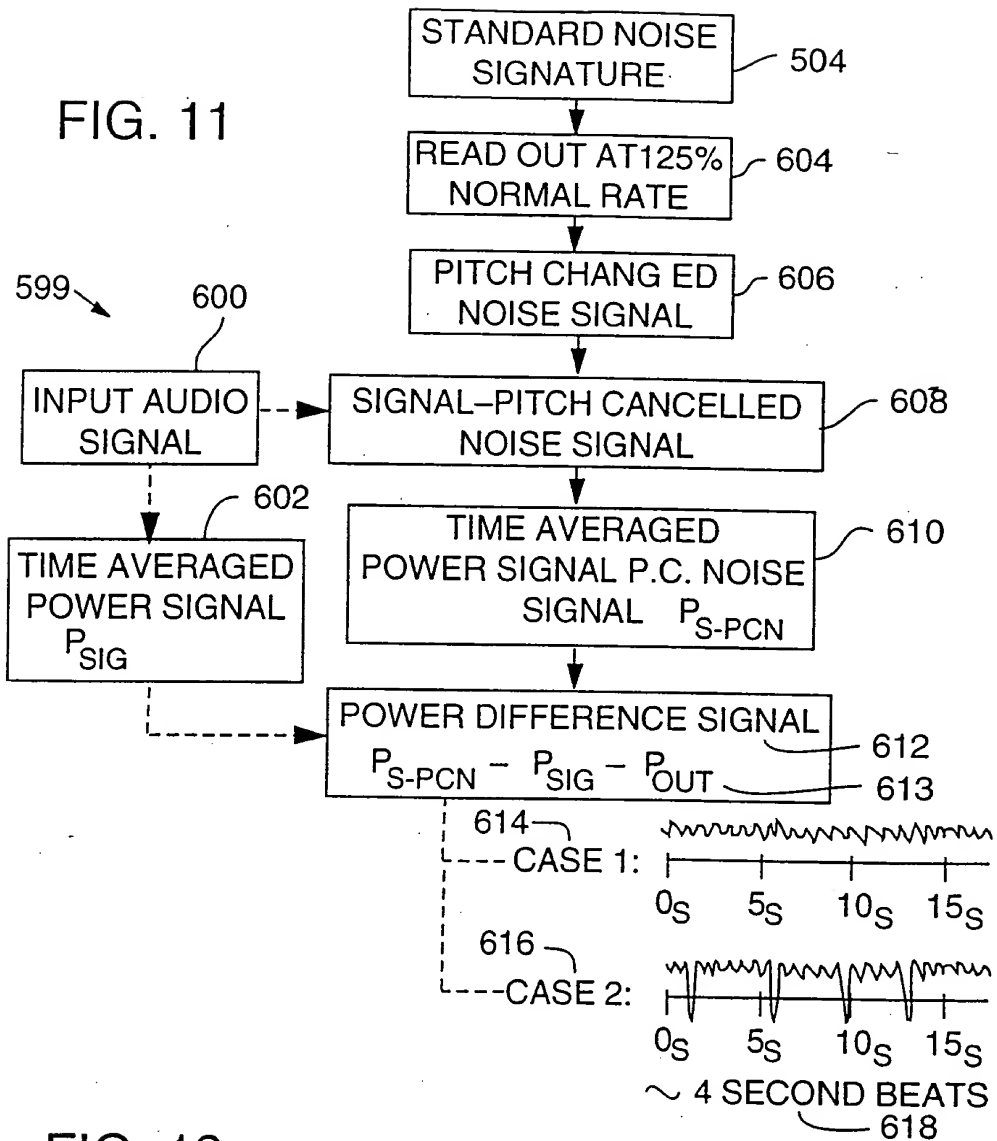


FIG. 12

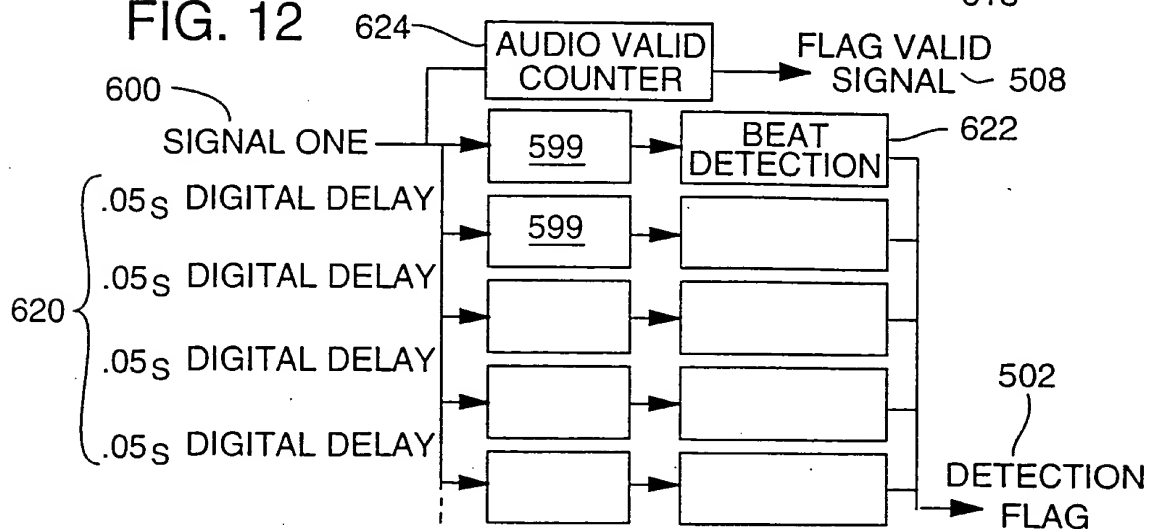
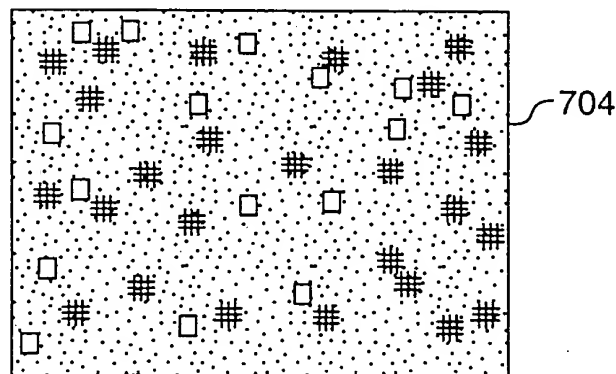
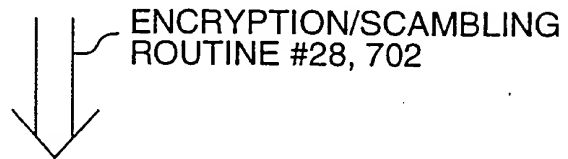
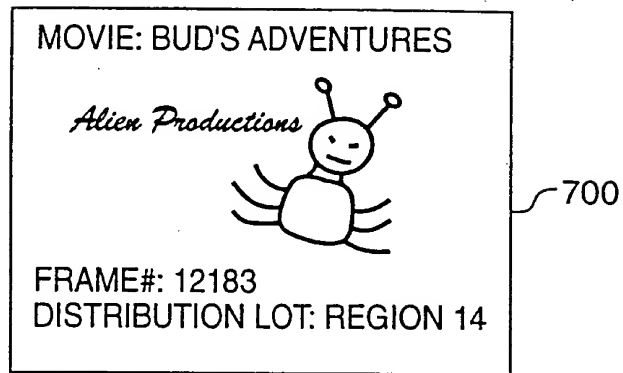
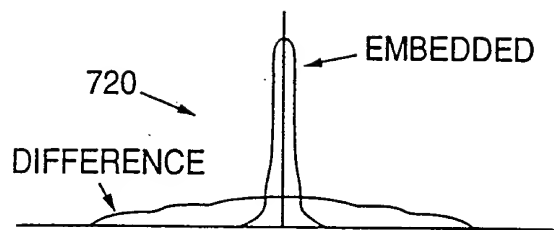


FIG. 13

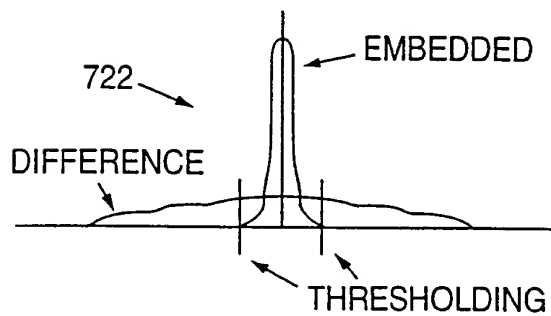


PSEUDO-RANDOM MASTER SNOWY IMAGE
(SCALED DOWN AND ADDED TO FRAME 12183)

FIG. 14



MEAN-REMOVED HISTOGRAMS OF
DIFFERENCE SIGNAL AND KNOWN EMBEDDED
CODE SIGNAL



MEAN-REMOVED HISTOGRAMS OF
FIRST DERIVATIVES (OR SCALAR GRADIENTS
IN CASE OF AN IMAGE)

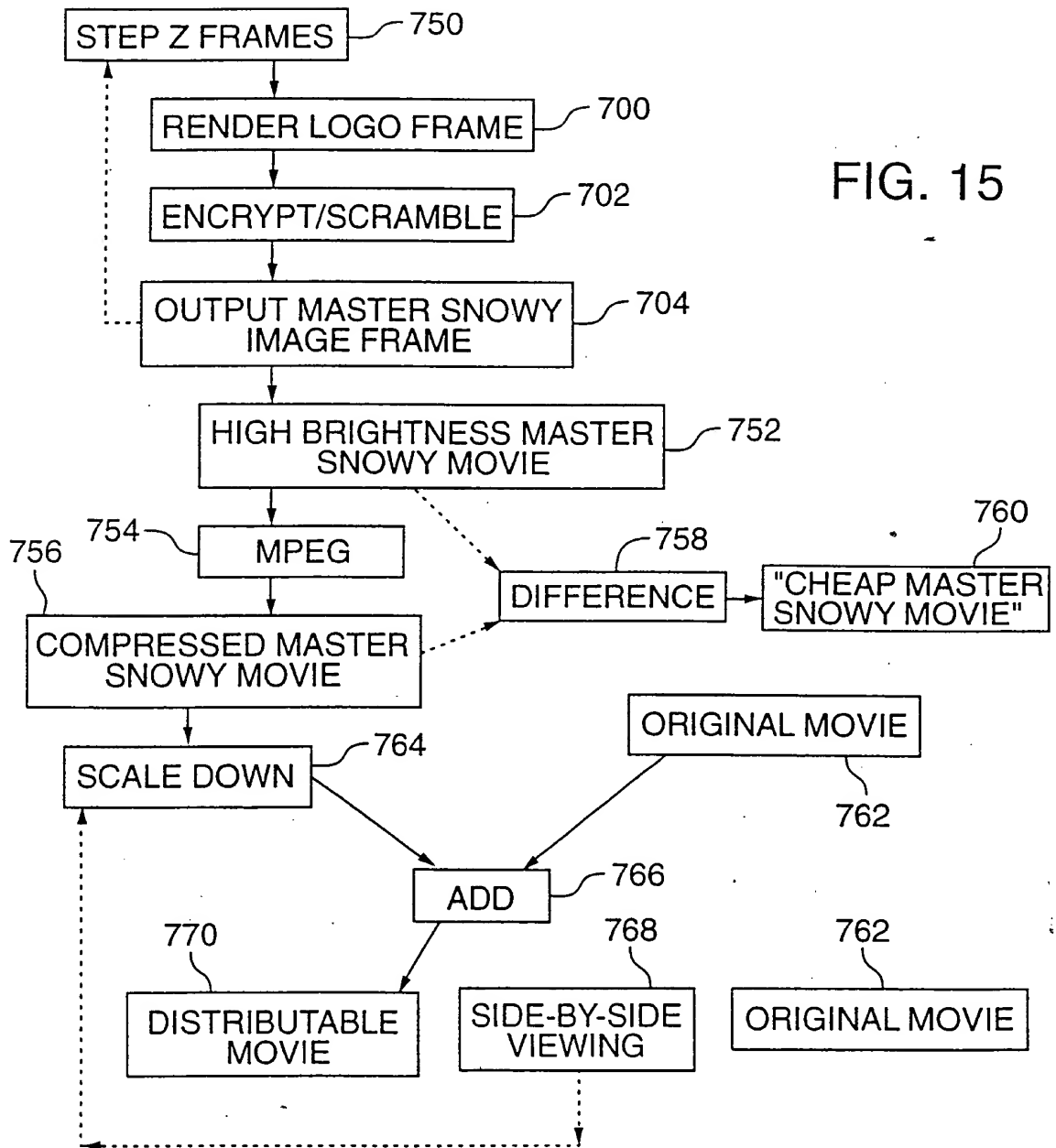


FIG. 15

FIG. 16

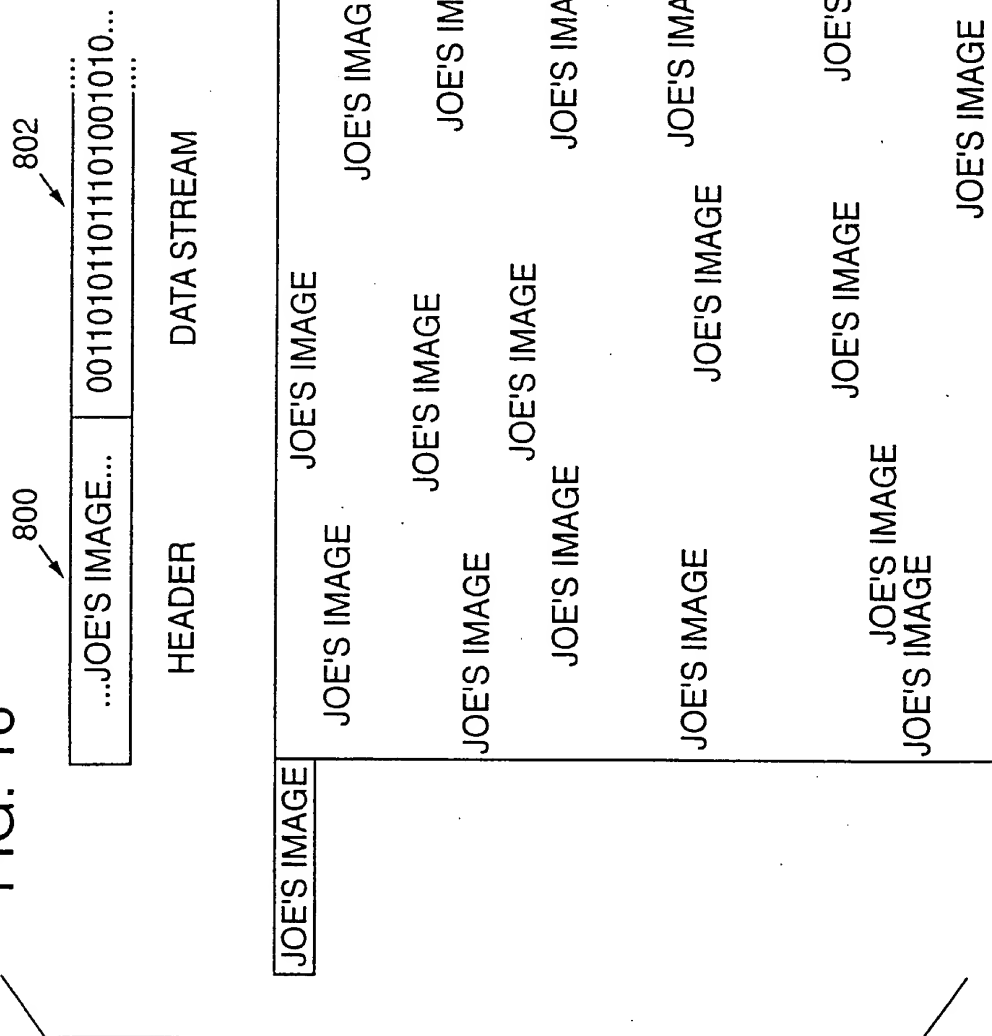


FIG. 17

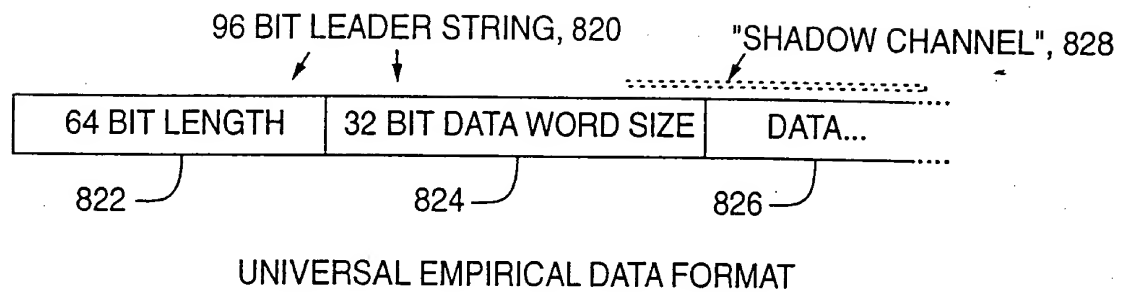


FIG. 18

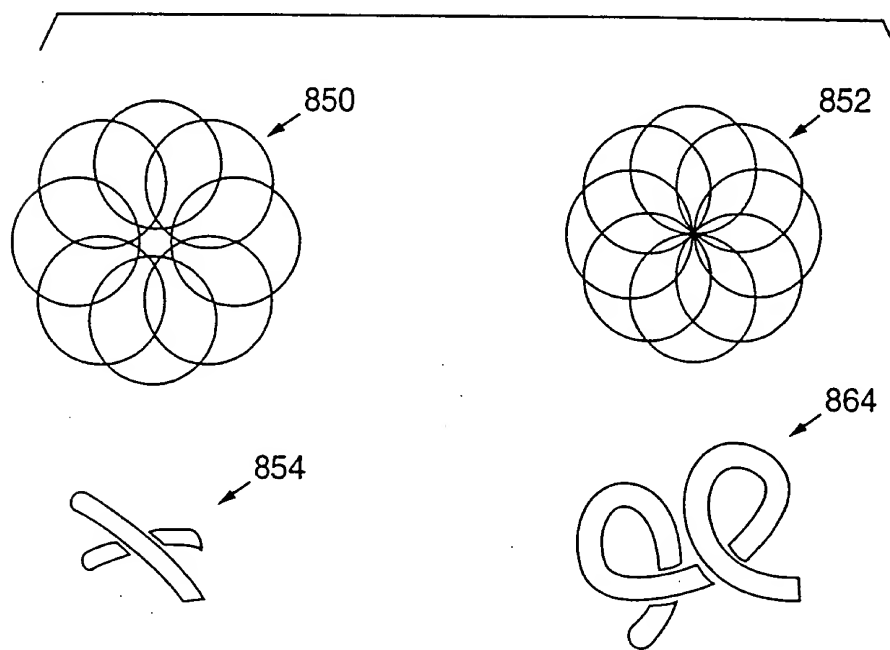


FIG. 19

866

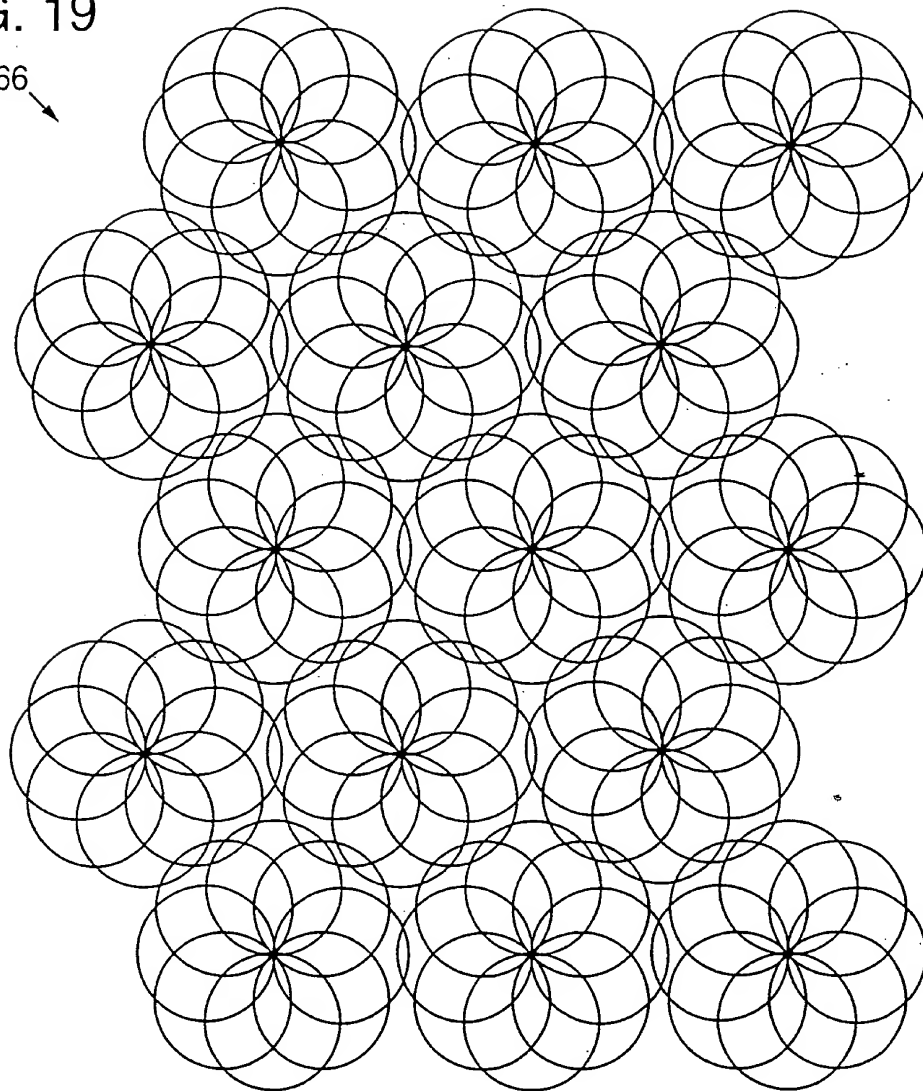


FIG. 20

BRIGHTNESS
PROFILE, 874

CENTER POINT OF
RING, 872

NOMINAL DISTANCE
TO CENTER OF OUTER
RING WIDTH, 870

NOMINAL DISTANCE
TO CENTER OF OUTER
RING WIDTH, 870

876

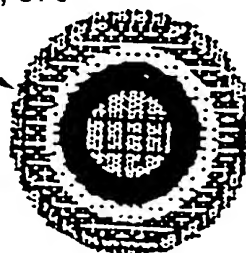


FIG. 21A

900

C	2C	C
2C	4C	2C
C	2C	C

WHERE $C = 1/16$

FIG. 21B

...	2	3	4	5	6	7	0	...	
...								...	
...	6	7	0	1	2	3	4	...	
...				C	2C	C		...	
...	2	3	4	2C	4C	2C	6	7	0
...				C	2C	C			
...	6	7	0	1	2	3	4		
...									
...									

FIG. 23

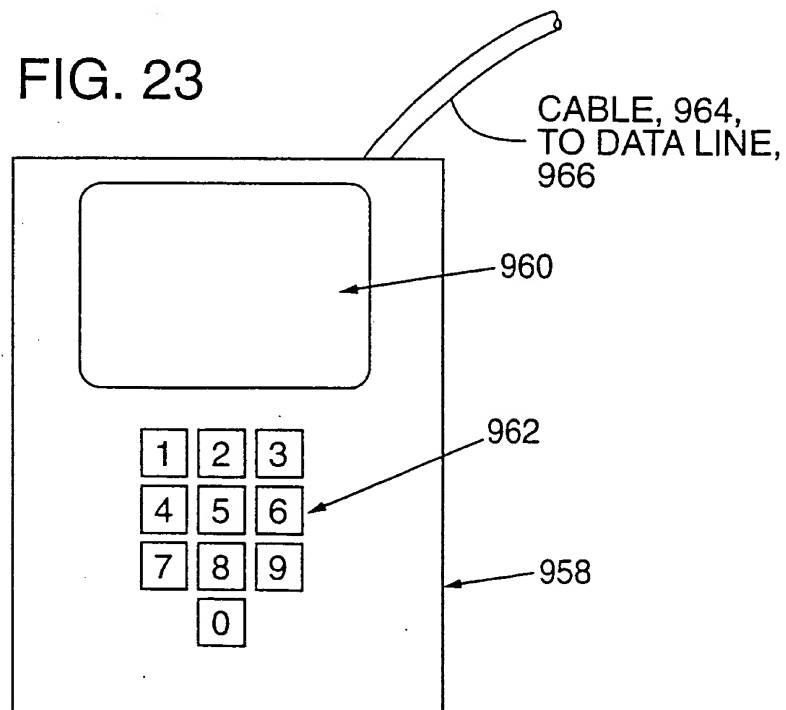
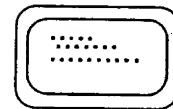


FIG. 22

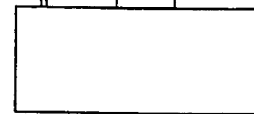
940
DIGITAL IMAGE TAKEN
OF CUSTOMER



942

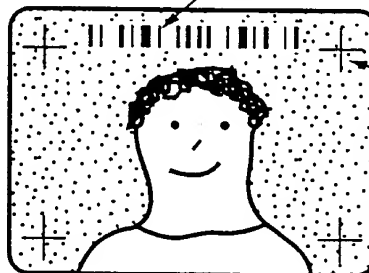


COMPUTER
PROCESSES NEW
ENCODED IMAGE



PRINTS
PROCESSED
IMAGE ONTO
PLASTIC CARD

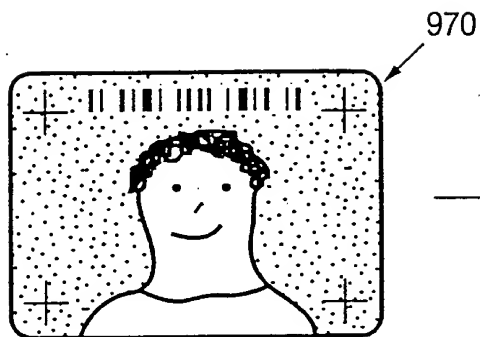
952



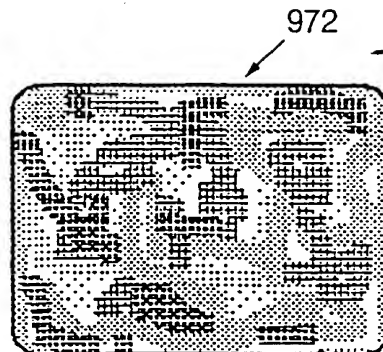
954

950

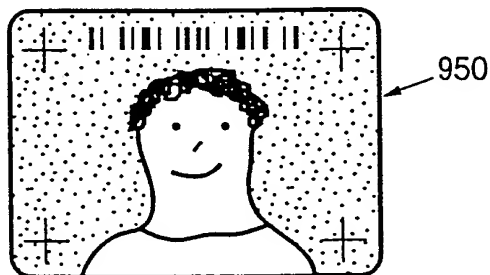
FIG. 24



ORIGINAL DIGITAL IMAGE WITH
BARCODE AND FIDUCIALS
ADDED



COMPUTER GENERATES MASTER
SNOWY IMAGE WHICH IS
GENERALLY ORTHOGONAL TO
ORIGINAL IMAGE AT LEFT



COMBINED TO FORM PERSONAL CASH CARD

FIG. 25 TYPICAL TRANSACTION STEPS

1. READER SCANS IMAGE ON CARD, STORES IN MEMORY, EXTRACTS PERSON'S ID
2. OPTIONAL: USER KEYS IN PIN NUMBER
 3. READER CALLS CENTRAL ACCOUNT DATA NETWORK, HANDSHAKES
 4. READER SENDS ID, (PIN), MERCHANT INFORMATION, AND REQUESTED TRANSACTION AMOUNT TO CENTRAL NETWORK
 5. CENTRAL NETWORK VERIFIES ID, PIN, MERCHANT INFO, AND ACCOUNT BALANCE
 6. IF OK, CENTRAL NETWORK GENERATES TWENTY-FOUR SETS OF SIXTEEN DISTINCT RANDOM NUMBERS, WHERE THE RANDOM NUMBERS ARE INDEXES TO A SET OF 64K ORTHOGONAL SPATIAL PATTERNS
 7. CENTRAL NETWORK TRANSMITS FIRST OK, AND THE SETS OF RANDOM NUMBERS
8. READER STEPS THROUGH THE TWENTY-FOUR SETS
 - 8A. READER ADDS TOGETHER SET OF ORTHOGONAL PATTERNS
 - 8B. READER PERFORMS DOT PRODUCT OF RESULTANT PATTERN AND CARD SCAN, STORES RESULT
 9. READER TRANSMITS THE TWENTY-FOUR DOT PRODUCT RESULTS TO CENTRAL NETWORK
 10. CENTRAL NETWORK CHECKS RESULTS AGAINST MASTER
 11. CENTRAL NETWORK SENDS FINAL APPROVAL OR DENIAL
 12. CENTRAL NETWORK DEBITS MERCHANT ACCOUNT, CREDITS CARD ACCOUNT

FIG. 26

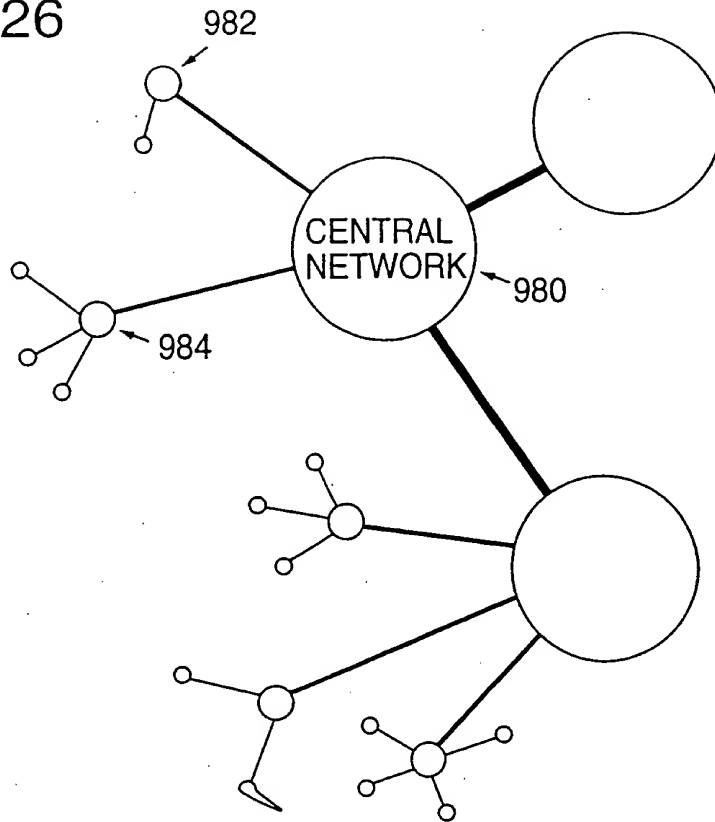


FIG. 27

